

REMARKS

Applicants thank the Examiner for the courtesy extended to Applicants' attorney during the interview held January 22, 2007, in the above-identified application. During the interview, Applicants' attorney explained the presently-claimed invention and why it is patentable over the applied prior art. The discussion is summarized and expanded upon below.

The rejections under 35 U.S.C. § 103(a) of Claims 1-5, 7-11, 15-18, 21 and 22 as unpatentable over U.S. 4,443,638 (Yates) and further in view of Miyazawa et al, and of Claims 6, 12-14, 19 and 20 as unpatentable over Yates further in view of Miyazawa et al, and further in view of U.S. 5,865,957 (Ueda et al), are respectfully traversed.

As recited in above-amended claim 1, the present invention (with numerals added in brackets and bolded to correspond to the numerals used in Fig. 1, which exemplifies the invention) is drawn to process for preparing aldehydes and alcohols comprising:

subjecting olefins having 6-20 carbon atoms to a rhodium-catalyzed hydroformylation [3] at an initial concentration of rhodium [2],

distilling [5] the output [4] from the hydroformylation, whereby hydroformylation products [6] and a rhodium-containing solution [7] are separated from said output, while setting the rhodium concentration of the rhodium-containing solution to 20-150 ppm by mass, and

recirculating said rhodium-containing solution, whereby the concentration of rhodium in the recirculated rhodium-containing solution is adjusted [8], [9] to an initial concentration of rhodium.

As Applicants' attorney noted during the above-referenced interview, the present invention relates to setting the rhodium concentration of a rhodium-containing solution that has been separated by distillation of the output from the hydroformylation reaction, which

rhodium-containing solution is recirculated, and which solution is not synonymous with the composition of the feed to the hydroformylation reactor, and thus, which solution has a rhodium concentration that is not necessarily the same as the initial concentration of rhodium to be used in the hydroformylation reaction. Claim 1 has now been amended to distinguish between an initial concentration of rhodium and the rhodium concentration of the above-discussed rhodium-containing solution. In addition, the end of amended Claim 1 recites “an” initial concentration of rhodium rather than “the” initial concentration of rhodium, since the gist of the present invention does not require that the initial concentration always be the same but rather that the rhodium concentration **of the rhodium-containing solution**, as opposed to the initial concentration, be within the presently-recited range of 20-150 ppm by mass.

The specification herein contains comparative data demonstrating the significance of the presently-claimed invention, and the superior results obtained thereby. Example 1 demonstrates a rhodium-catalyzed hydroformylation employing an initial rhodium concentration of 10 ppm. In (Comparative) Example 2, a process analogous to the presently-claimed process was carried out, except that the rhodium concentration of the rhodium-containing solution was 248 ppm. In Example 3, a process according to the presently-claimed invention was carried out, wherein the rhodium concentration of the rhodium-containing solution was 43 ppm. In each of (Comparative) Example 4 and Example 5, the amount of rhodium in the recirculated rhodium-containing solution of (Comparative) Example 2 and Example 3, respectively, was subsequently set or adjusted to the original 10 ppm initial concentration of Example 1, and the hydroformylation again carried out. In Example 1, tributene conversion was 81.2% and yield of desired products (C13-aldehyde/-alcohol) was 79.7%. In (Comparative) Example 4, the tributene conversion decreased to 67.3% and the yield of desired product (C13-aldehyde/-alcohol) decreased to 66.2%. In Example 5, on the other hand, the tributene conversion decreased only slightly, i.e., to 80.5%,

and the yield of desired product (C13-aldehyde/-alcohol) also decreased only slightly, i.e., to 79.0%.

The above-discussed results are indeed unexpected, since the prior art neither discloses nor suggests that controlling the rhodium concentration at the present point in the process, i.e., after distillation of the output from the hydroformylation, whereby hydroformylation products and a rhodium-containing solution are separated from the output.

Yates, which was cited in the International Search Report for the corresponding international application as an “A” reference, i.e., not considered to be particularly relevant, relates to a rhodium-catalyzed hydroformylation process, wherein the initial concentration of rhodium is no greater than 20 ppm (column 2, lines 46-58). Yates does not disclose the rhodium concentration in his recycled catalyst solution. For example, and as previously argued in the amendment filed January 24, 2006, in Example 2 therein, the reaction mixture contains 10 ppm of rhodium (column 5, lines 41-42). Yates discloses recycling the mixture by taking the bottoms fraction, referred to as BTM, as shown in Table 5, and combining the bottoms with another amount of 700 g of n-decenenes (column 5, lines 50-51). If one were to assume that no heterogeneous precipitation of rhodium metal occurred after the first cycle, then the amount of recycled rhodium would be at most 10 ppm. However, since Yates does not disclose the amount of rhodium in the recycled fraction, then it is impossible to ascertain the recycled catalyst concentration. Since it is impossible to calculate this value, and since Yates does not disclose it, it is clear that the present invention is neither disclosed nor suggested by Yates.

In the Office Action dated March 27, 2006, in response to the above argument regarding Example 2 of Yates, the Examiner pointed to Example 1 thereof, particularly experiment B therein, wherein the initial rhodium concentration was 25 ppm. The Examiner then speculated that “[e]ven if during the reaction, 20% of the catalyst were lost, there would

still be 20 ppm of the rhodium catalyst recovered that can be recycled to the hydroformylation reaction.”

In reply, even if there were some basis in fact for the Examiner’s speculation, it is irrelevant. The concentration of the rhodium in the rhodium-containing solution according to the present invention cannot be compared to the initial rhodium concentration, because other components of the rhodium-containing solution are necessarily different, or present in different amounts, from the other components in the feed to the hydroformylation reactor.

In the Office Action of March 27, 2006, the Examiner also stated that he “does not believe that Applicants have shown how, or why, the rhodium concentration of the *recirculated* rhodium-containing solution affects or enhances the hydroformylation reaction of the present invention such that the claimed process is patentable over prior art hydroformylation reactions using rhodium-containing catalysts.”

In reply, it is well-known that it is not a requirement of the patent statutes that an inventor explain how or why an invention works. As discussed above, Applicants have shown that it does work, with the above-discussed comparative data as support, and that Yates neither discloses nor suggests the presently-claimed invention.

The Examiner relies on Miyazawa et al for a disclosure of pressure and Ueda et al for a disclosure of solvents. But even if Miyazawa et al, or Miyazawa et al and Ueda et al, were combined with Yates, the result would still not be the presently-claimed invention.

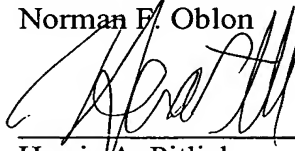
For all the above reasons, it is respectfully requested that the rejections be withdrawn.

Applicants respectfully submit that all of the presently-pending and active claims in this application are now believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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